Docket No.: UPAP000: 100 **Serial Number: (/359,975**
PATENT **Filed: July 3, 1999**

1-57. (canceled)

58. (previously amend d) A pharmaceutical composition comprising:

a) a polynucleoti e function enhancer; and

b) A DNA molec le that comprises a DNA sequence that encodes an antige from an intracellular pathogen; v herein

i) said po nucleotide function enhancer is a compound having one of the following formulas:

$$Ar - R^1 - O - R^2 - R^3$$

or

$$Ar - N - R^1 - R^2 - R^3$$

or

$$R^4 - N - R^5 - R^6$$

or

$$R^4 - O - R^1 - R^7$$

wherein:

Ar is ben ne, *p*-aminobenzene, *m*-aminobenzene, *o*-aminobenzene, substituted benzene, sub ituted *p*-aminobenzene, substituted *m*-aminobenzene, sub ituted *o*-aminobenzene, wherein t e amino group in the aminobenzene compounds can be ar ino, C_1 – C_5 alkylamine, C_1-C_5, C C_5 dialkylamine and substitutions in substituted compoun s are halogen, C_1-C_5 alkyl and C_1-C_5 alkoxy;

R^1 is C=

R^2 is C_1-C $_0$ alkyl including branched alkyls;

R^3 is hydr gen, amine, C_1-C_5 alkylamine, C_1-C_5, C_1-C_5 dialkylamine

$R^2 + R^3$ c n form a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alk , a cyclic aliphatic amine, a C_1-C_1 alkyl substituted cyclic aliphatic amine, a heterocycle, a C C_{10} alkyl substituted heteroc cle including a C_1-C_{10} alkyl N-substituted heterocycle;

R^4 is Ar, ^{2} or C_1-C_5 alkoxy,a cyclic alkyl, a C_1-C_{10} alkyl substituted yclic alkyl, a cyclic aliphatic a ine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a

heterocycle, a C_1-C_{10} alkyl substituted heterocycle and a C_1-C_{10} alkoxy substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle;

R^5 is C=NH;

R^6 is Ar, R^2 or C_1-C_5 alkoxy, a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle and a C_1-C_{10} alkoxy substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle; and,

R^7 is Ar, R^2 or C_1-C_5 alkoxy, a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle and a C_1-C_{10} alkoxy substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle; and,

ii) said DNA sequence operatively linked to regulatory sequences which control the expression of said DNA sequence.

59. (original) The pharmaceutical composition of claim 58 wherein said DNA molecule is a plasmid.

60-62. (canceled)

63. (Previously amended) The pharmaceutical composition of claim 58 wherein said antigen is a viral antigen.

64. (previously added) The pharmaceutical composition of claim 63 wherein said pathogen is a virus selected from the group consisting of: human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

65-114. (canceled)

115. (previously added) A method of introducing DNA molecules into cells of an individual comprising the steps of:

injecting into tissue of said individual at a site on said individual's body, DNA molecules and a polynucleotide function enhancer; wherein

i) said polynucleotide function enhancer is a compound having one of the following formulas:

$$Ar - R^1 - O - R^2 - R^3$$

or

$$Ar - N - R^1 - R^2 - R^3$$

or

$$R^4 - N - R^5 - R^6$$

or

$$R^4 - O - R^1 - R^7$$

wherein:

Ar is benzene, *p*-aminobenzene, *m*-aminobenzene, *o*-aminobenzene, substituted benzene, substituted *p*-aminobenzene, substituted *m*-aminobenzene, substituted *o*-aminobenzene, wherein the amino group in the aminobenzene compounds can be amino, $C_1 - C_5$ alkylamine, C_1-C_5, C_1-C_5 dialkylamine and substitutions in substituted compounds are halogen, C_1-C_5 alkyl and C_1-C_5 alkoxy;

R^1 is C=O;

R^2 is C_1-C_{10} alkyl including branched alkyls;

R^3 is hydrogen, amine, C_1-C_5 alkylamine, C_1-C_5, C_1-C_5 dialkylamine;

$R^2 + R^3$ can form a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle;

R^4 is Ar, R^2 or C_1-C_5 alkoxy,a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle and a C_1-C_{10} alkoxy substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle;

R^5 is C=NH;

R^6 is Ar, R^2 or C_1-C_5 alkoxy, a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle and a C_1-C_{10} alkoxy substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle; and,

R^7 is Ar, R^2 or C_1-C_5 alkoxy, a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle and a C_1-C_{10} alkoxy substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle; and,

ii) said DNA molecules are taken up by cells in said tissue.

116. (previously added) The method of claim 115 wherein said DNA molecule comprises a DNA sequence that encodes a protein, said DNA sequence operatively linked to regulatory sequences which control the expression of said DNA sequence.

117. (previously added) The method of claim 115 wherein said DNA molecule is a plasmid.

118. (previously added) The method of claim 115 wherein said tissue includes skin and muscle.

119. (previously added) The method of claim 115 wherein said tissue is skin.

120. (previously added) The method of claim 115 wherein said tissue is muscle.

121. (previously added) The method of claim 120 wherein said tissue is skeletal muscle.

122. (previously added) A pharmaceutical composition according to claim 58, wherein said polynucleotide function enhancer is a compound having the formula $Ar-R^1-O-R^2-R^3$.

123. (previously added) The pharmaceutical composition of claim 122 wherein said DNA molecule is a plasmid.

124. (previously added) The pharmaceutical composition of claim 122 wherein said antigen is a viral antigen.

125. (previously added) The pharmaceutical composition of claim 124 wherein said pathogen is a virus selected from the group consisting of: human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

126-140 (canceled)

141. (previously added) A method of introducing DNA molecules into cells of an individual according to claim 115, wherein said polynucleotide function enhancer is a compound having the formula $Ar-R^1-O-R^2-R^3$.

142. (previously added) The method of claim 141 wherein said DNA molecule comprises a DNA sequence that encodes a protein, said DNA sequence being operatively linked to regulatory sequences which control the expression of said DNA sequence.

143. (previously added) The method of claim 141 wherein said DNA molecule is a plasmid.

144. (previously added) The method of claim 141 wherein said tissue includes skin and muscle.

145. (previously added) The method of claim 141 wherein said tissue is skin.

146. (previously added) The method of claim 141 wherein said tissue is muscle.

147. (previously added) The method of claim 146 wherein said tissue is skeletal muscle.

148. (previously added) A method of inducing antibodies against an antigen in an individual comprising the steps of:

injecting into tissue of said individual at a site on said individual's body, a DNA molecule and a polynucleotide function enhancer,

said DNA molecule comprising a DNA sequence that encodes an antigen, said DNA sequence operatively linked to regulatory sequences which control the expression of said DNA sequence,

said polynucleotide function enhancer is a compound having one of the following formula:

$$Ar-R^1-O-R^2-R^3$$

or

$$Ar-N-R^1-R^2-R^3$$

or

$$R^4-N-R^5-R^6$$

or

$$R^4-O-R^1-R^7$$

wherein:

Ar is benzene, *p*-aminobenzene, *m*-aminobenzene, *o*-aminobenzene, substituted benzene, substituted *p*-aminobenzene, substituted *m*-aminobenzene, substituted *o*-aminobenzene, wherein the amino group in the aminobenzene compounds can be amino, C_1-C_5 alkylamine, C_1-C_5 C_1-C_5 dialkylamine and substitutions in substituted compounds are halogen, C_1-C_5 alkyl and C_1-C_5 alkoxy;

R^1 is C=O;

R^2 is C_1-C_{10} alkyl including branched alkyls;

R^3 is hydrogen, amine, C_1-C_5 alkylamine, C_1-C_5, C_1-C_5 dialkylamine;

$R^2 + R^3$ can form a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle;

R^4 is Ar, R^2 or C_1-C_5 alkoxy,a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle and a C_1-C_{10} alkoxy substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle;

R^5 is C=NH;

R^6 is Ar, R^2 or C_1-C_5 alkoxy, a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle and a C_1-C_{10} alkoxy substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle; and,

R^7 is Ar, R^2 or C_1-C_5 alkoxy, a cyclic alkyl, a C_1-C_{10} alkyl substituted cyclic alkyl, a cyclic aliphatic amine, a C_1-C_{10} alkyl substituted cyclic aliphatic amine, a heterocycle, a C_1-C_{10} alkyl substituted heterocycle and a C_1-C_{10} alkoxy substituted heterocycle including a C_1-C_{10} alkyl N-substituted heterocycle; and,

wherein said DNA molecule is taken up by cells in said tissue, said DNA sequence is expressed in said cells and an immune response is generated against said antigen.

149. (previously adde The method of claim 148 wherein said polynucleotide function enhancer is a compoun aving the formula $Ar-R^1-O-R^2-R^3$.

150. (previously added The method of claim 148 wherein said DNA molecule is a plasmid.

151. (previously added The method of claim 148 wherein said antigen is an intracellular pathogen a gen.

152. (previously added The method of claim 148 wherein said antigen is a viral antigen.

153. (previously added The method of claim 152 wherein said viral antigen is of a virus selected from the oup consisting of: human immunodeficiency virus, HIV; Human T cell leukemia virus, HT /; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma rus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV2; Cytomegaloviru CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

154. (previously added The method of claim 148 wherein said tissue includes skin and muscle.

155. (previously adde The method of claim 154 wherein said tissue is skin.

156. (previously added The method of claim 154 wherein said tissue is muscle.

157. (previously added The method of claim 156 wherein said tissue is skeletal muscle.

158. (new) The meth d of claim 149 wherein said DNA molecule is a plasmid.

159. (new) The method of claim 149 wherein said antigen is an intracellular pathogen antigen.

160. (new) The method of claim 149 wherein said antigen is a viral antigen.

161. (new) The method of claim 160 wherein said viral antigen is of a virus selected from the group consisting of: human immunodeficiency virus, HIV; Human T cell leukemia virus, HTLV; influenza virus; hepatitis A virus; hepatitis B virus; hepatitis C virus; human papilloma virus, HPV; Herpes simplex 1 virus, HSV1; Herpes simplex 2 virus, HSV 2; Cytomegalovirus, CMV; Epstein-Barr virus, EBR; rhinovirus; and, coronavirus.

162. (new) The method of claim 149 wherein said tissue includes skin and muscle.

163. (new) The method of claim 162 wherein said tissue is skin.

164. (new) The method of claim 162 wherein said tissue is muscle.

165. (new) The method of claim 164 wherein said tissue is skeletal muscle.